DOCUMENT RESUME

ED 233 703 IR 010 794

AUTHOR Cohen, Vicki Blum
TITLE Utilizing Interactive Features in the Design of Videodisc Materials.
PUB DATE Apr 83
NOTE 20p.; Paper presented at the Annual Meeting of the American Educational Research Association (Montreal, Canada, April 11-14, 1983).
PUB TYPE Viewpoints (120) -- Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS *Design Requirements; Educational Quality; *Evaluation Criteria; *Feedback; Flexible Progression; *Individual Needs; Instructional Materials; Learning Modules; *Videodisc Recordings
IDENTIFIERS *Interactive Systems

ABSTRACT

As the videodisc becomes a potent force in the industrial and the educational market, it becomes increasingly important to develop high-quality, effective videodisc programs. Interactivity is an important evaluation criterion when analyzing a program's instructional effectiveness. The following interactive features can be incorporated in the design of videodisc programs: (1) nonlinear format of content; (2) user control options; (3) feedback which ensures remediation; (4) modular organization of content; (5) flexibility of different user needs; (6) the Videobank (an ISO Communications trademark), which contains skill-oriented still frames related to each module or segment of the disc; and (7) the Browser (also an ISO trademark), a device which allows the viewer, trainer, or teacher to find the correct still frame in each skillbank. These new techniques are a start in the right direction, but the whole concept of interaction needs to be revised and conceived of in terms of quality, not just viewed as a student pushing a key and receiving an answer. (Author/LMM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED233703

Utilizing Interactive Features in the Design of VIdeodisc Materials

by

Vicki Blum Cohen

Presented at the annual meeting of the AERA

Montreal, Canada; 1983

Printed in the U.S.A.

© Vicki Blum Cohen, 1983

IR010794

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Vicki Blum Cohen

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ABSTRACT

Utilizing Interactive Features in the
Design of Videodisc Materials
by Vicki Blum Cohen

As the videodisc becomes a potent force in the industrial and the educational market, it becomes increasingly important to develop quality videodisc programs that are effective. When analyzing a program in terms of its instructional effectiveness one important criterion to consider is its interactivity, or how it engages the learner in the instructional sequence so that the learner is actively involved with the program. The following interactive features can be incorporated in the design of videodisc programs and are discussed in this paper: 1) nonlinear format of content; 2) user control options; 3) feedback which ensures remediation; 4) modular organization of content; 5) flexibility of different user needs; 6) The Videobank (TM, ISO Communications); 7) The Browser (TM, ISO Communications). The whole concept of interaction needs to be revised and conceived of in terms of quality, not just a student pushing a key and receiving an answer. The techniques described here are but a start in this direction.

010794

Introduction

This paper will describe some interactive features that have been incorporated into the design of videodisc programs at ISO Communications, Inc. in New York. Many of these features are in a developmental stage and are being utilized in an experimental fashion utilized to enhance interactivity in instructional programs.

Furthermore, this paper will discuss the issue of interactivity and the need to incorporate quality interactions into videodisc programs. As videodisc and computer-based instruction becomes more popular, attempts are made to create programs for this new technology. The results are often devastating and boring as there is little understanding of what interactivity means and little attempt to apply sound instructional design theories into the program. Programmers feel they can go it alone and video producers see no need for an instructional designer. The results of their efforts are often proof of this resistance.

This paper is an attempt to apply some quality standards to the field and introduce some new techniques that will hopefully improve the quality and effectiveness of videodisc programs.

The Importance of Interactivity

With the recent developments in microprocessor technology, the ability to merge video and computer has produced a new technology of instruction, the videodisc. Although videodisc technology has captured our imagination as a unique and exciting instructional tool, its full capabilities have yet to be fully explored. It is predicted that by 1990 the installed base of videodisc players in the industrial market will be 740,000 (The Yankee Group, 1982). It is projected that most of these will be used for training purposes.

With this forecast in mind, videodisc instruction will become a potent force in the industrial and educational market. As this new technology starts to impact instructional development, new theories of learning must be applied to accomodate this alternate mode of interacting with the subject matter and new instructional strategies must be incorporated into the design. The videodisc presupposes a new way that the learner will process information which is different from the much more structured, linear approach of a book or videotape. The very nature of this medium will influence how a student learns and force the student to develop new learning strategies that facilitate acquistion, retention and retrieval of information. As Marshal McLuhan has stressed, it is the medium that will have the greatest impact on learning, not necessarily the message or what is being taught. The physical properties of the videodisc will ultimately dictate the essential form of the message transmitted on it and influence the way a student processes the information. A student learning from a

book must utilize different strategies to structure and process the subject matter than when viewing a nonlinear, interactive videodisc with immediate feedback and instantaneous access of information.

One of the most important features of the videodisc as an instructional tool is its ability to interact with the learner while presenting real-life demonstrations, thus enhancing the effectiveness of the instruction. The combination of video images and computer-based instruction transforms interaction into a more personal, user-friendly atmosphere, one the learner feels comfortable in and accustomed to. It is as if the viewer is having a "dialogue" with his/her television screen. The physical components of the hardware are familiar and the presentation of information is not seen as "too computerized" or threatening. It is therefore mandatory that the software design, itself, build upon this milieu and promote an atmosphere which enhances interactivity, establishing a rich dialogue between the learner and the instructional program. The software should encourage the learner to become actively involved in the learning process and thereby promote the development of individual learning strategies. The use of the interactive capabilities of the videodisc becomes the message that students will respond to.

That a student should be an active participant in the learning process is not a new notion, going back at least as far as Socrates. With the advent of computer-based instruction, either using a computer alone or in combination with an optical videodisc, the whole concept of interactive learning is receiving a great deal of attention and there is now a possibility that

individualized instruction can be extended to all students in the classroom whereby a student would interact with a "surrogate" teacher, or the new technology, in a Socratic fashion.

But oftentimes there tends to be a great discrepancy between the theoretical concept and the actual application in an instructional program. "Interactivity" can be an elusive phenomenon and has recently come to represent many different applications on the computer. It has become a catch-all phrase for producers, clients and consumers who claim they want to use the videodisc because of its unique interactivity, not really being sure what interactive means and how it might differ from the traditional linear video courses they use for instruction. In fact, oftentimes what they receive on the videodisc is less interactive than one of their good print-based programmed-instruction courses!

An interactive program is one in which the student is actively involved in responding to the instructional lesson so that some sort or qualitative response is required from the student in order for the instruction to continue. The instruction is dependent upon a student's entry and is designed to accomodate many different styles of learning and many different types of responses. This type of active learning is greatly desired in any learning situation and has shown to facilitate instructional effectiveness of the medium.

Bork (1982) has pointed out that quality of interaction can be assessed by noting the type of input required of the student during the interaction, the method of analyzing this response,

and the action taken in the program after the input. What Bork is saying is that the quality of interaction in the design of the program ultimately determines the quality of the instructional program produced. Making a student become actively involved with the learning situation increases the likelihood that the student will learn. This idea is not a new one but can be dated back to the Programmed Instruction Movement when this was really the rationale behind the whole development of materials (Lumsdaine, 1963).

But the Programmed Instruction Movement failed mainly because the programs were so boring and the learning machines kept breaking down. Hopefully this will not forewarn of doom to the new Interactive Movement that has sprung from computer-based technology. Computer-based materials are unique in the variety of ways they can be used and if utilized with a full understanding of the technology, they can be an extremely powerful and exciting instructional device that promotes higher learning in the student. But the success of this type of instruction will ultimately depend upon the quality of the software programs that are developed for them.

There is a great need to incorporate instructional strategies into the design of computer-based materials and to try and increase the quality of interactivity within the program. Oftentimes a program may be judged highly interactive based upon the number of responses that are required of the learner in a specified period of time. Although quantity of responses is an important issue to consider, it is also necessary to assess the type of response that is required and how the program manages the

interactivity. Many different techniques can be utilized to ensure this type of quality interaction.

This paper will describe those features which are necessary to consider in the design of interactive materials. It will also describe how ISO Communications has been utilizing some of these unique features to increase the quality of interactivity in the instructional design of videodisc programs.

Interactive Features

The following interactive features and techniques have been used to enhance interaction in videodisc projects at ISO.

Nonlinear Format of Content

Perhaps one of the more significant aspects of computer-based materials is when a student may choose a nonlinear path through the program based upon individual needs. The student can directly interact with the content by choosing his/her own sequence and direction through the material. The content should be organized with this option in mind so that if the learner desires, he/she may jump back and forth between instructional sequences. This does not preclude a hierarchical structure of learning as being a significant factor in some learning sequences whereby it is necessary to go step by step through the content. But there should be some consideration in the design which would allow learners the option to view certain protions of the material as their own needs dictate after they have learned the necessary prerequisites. An option may also be where there are two different paths through the same material to accomodate two

different types of audiences whereby one learner is "forced" to take a structured path through all the topics and the other learner is given the option to jump around.

This type of nonlinear format of content promotes higher learning by allowing the content to be organized in the student's mind according to individual needs and his/her own internal logic-order of the subject matter. An important strategy to help facilitate memory in an individual is organization or grouping together of the same category items. If the learner studied conceptually related items together, he/she would tend to cluster these items together in recall and thereby facilitate memory (Flavell, 1977). Allowing the learner to choose which items cluster naturally together would help to promote future retention of the content. This type of interaction with the instructional material would contribute to the quality of learning.

User Control Options

It is important that the design of an interactive program contains built-in options so that the learner can a) exit any part of the program whenever he/she desires, b) choose to review certain sections of the content or the directions, c) go to a HELP sequence upon request, and d) change various parameters of the lesson upon request (i.e. take a post-test or go on, choose which lesson comes next, determine the mastery score of a test). Such features ensure a richer instructional dialogue between the learner and the material and promotes a greater amount of achievement. This type of learning would encourage a more

deductive approach and allow the student to take more responsibility for his/her learning.

It should be noted here that oftentimes a program will contain a HELP function which virtually provides little help for the student. It may reiterate the directions or provide some trivial explanation but does not function in a corrective, comprehensive fashion. A good HELP function will restate the concept in simpler terms, breaking down the concept or skill into its component parts. It should offer guidance and direction as to where more help can be found if confusion still persists. This HELP function is an extremely important interactive feature which can make a program much more user-friendly and supportive of individual needs.

Caution does need to be taken in the implementation of extensive user control. It has been suggested that such a free learning situation might interfere with student achievement with less competent, less confident students (Hartley and Lovell, 1978). Learners with such control might not make effective decisions concerning their own learning sequence. Evidence argues for adaptive rules in which more responsibility is given to the learner as he/she becomes more competent and confident. Nevertheless, basic built-in options which allow the learner a certain amount of control is highly suggested and desired in interative programs.

Feedback Which Ensures Remediation

Feedback can be defined as the message or compound statement which follows the response made by the learner (Hartley and

Lovell, 1978). If used appropriately, feedback should locate an error and inform the student why it is wrong and how to correct it. Unfortunately, few computer-based programs take full advantage of the value of feedback and are not structured so as to control the amount and type of feedback (Hartley and Lovell, 1978) or to provide remediation (Blum Cohen, 1982).

Remediation is an extremely important feature which ensures that when the learner responds incorrectly to a question he/she will be branched to a remedial sequence whereby the information is reviewed using an alternate approach to the content. Being looped back to the same sequence that was initially viewed is not remediation but review; this approach is not as effective and is commonly found in programs that claim to "remediate."

Feedback plays a very important role in interactive learning, its most important function being knowledge of correct results. Providing only positive feedback is less facilitative during acquisition of instruction, and if one was given the choice, feedback following wrong responses probably has the greatest effect on learning (Anderson, Kulhary and Andre, 1972; Barringer and Gholson, 1979; Hartley and Lovell, 1978).

Modular Organization of Content:

Modular organization ensures that the content is broken up into small, discrete units which can be immediately accessed by the learner. The use of modules allows more adaptive instruction to occur whereby individual entry competencies and rates of learning are taken into account, permitting self-pacing and self-correction for each learner (Gagne and Briggs, 1979).

By using modules, a more individualized approach to the content can be attained. This can occur in two ways: 1) by having the program branch the learner to the appropriate module based on test scores, entry competencies, or audience characteristics (i.e. training managers go to one module while technicians go to another). Using this approach, the program makes the adaptive decisions as to where the learner will go in the content; or 2) by content menus whereby the viewer may choose his/her own path through the program based upon individual needs.

Modules also ensure that the content is broken up into units of instruction that the learner is capable of viewing quickly. If the surrounding environment is a busy and hectic one, there is a good chance that the learner will be unable to sit down and view the disc from beginning to end in one sitting. Module organization allows each learner to progress through the content at his/her own pace.

Modular organization also facilitates the development of specific behavioral objectives, performance measures and the design of interactive features. By dealing in small discrete units, the content is more manageable and the designer is more

capable of developing a learning sequence which is focused, tightly designed and effectively assesses each learner's performance.

Lastly, modular organization ensures that the disc can be used in a flexible way by many different users. The disc may be used as a sales tool whereby two modules alone will be accessed during a sales presentation. The same disc could be used as a self-paced course for sales personnel, managers, or executives, whereby every module is used in the course.

Flexibility of Different User Needs

Oftentimes a designer of computer-based instructional materials will find that the prospective course to be developed must accomodate many different audiences with many different needs. This dilemma can only be solved by designing the content in a flexible, fluid way so that it is responsive to the various learner's needs. There are a few different techniques to facilitate this. The most evident solution is to incorporate different paths through the content for the different audiences. As mentioned before, this could be done by having the program branch to different instructional sequences according to the audience or by using content menus and having the learner choose which module to view. A combination of these two approaches is possible whereby the learner must answer an initial question or set of questions about his/her background or job position and then, based upon the response, is branched to a specific menu and can view only that portion of the disc especially designed for that target audience.

Another similar way to accomodate different audiences is to have pretests and/or posttests. Based upon the learner's response to the tests, he/she is branched to a particular segment and taken through the program. Thus, a learner can progress through the content which is suited to his/her own level of expertise based upon responses to a series of performance measures found at the end of each module. In this way the learner has no choice of sequence but is taken through a path which could be very different from another learner.

An interesting way to accomodate different audiences is to have interactive case-studies or vignettes as modules. There would be decision-points whereby a learner must respond to a situation and based upon his/her perception of that situation branched to a subsequent scene. Each scene would be the logical progression of the learner's responses until the final scene would portray the outcome of the learner's decisions. This type of case-study approach can be an excellent interactive exercise to summarize many concepts taught in the program.

The last way one can accomodate two different audiences is by using the dual audio track on the videodisc. This features allows a bilingual approach to the content. In addition, the same video segment can be used with a different explanation on each audio track. For example, a program demonstrating techniques could have one track explaining procedures to a doctor, and one track could be for a nurse.

Of course, a combination of these techniques can be used to effectively accomodate different audiences through the same course. The emphasis is on flexibility and to incorporate a

variety of ways the different learners interact with the material so that the course satisfies the learner's needs in the most instructionally effective way possible.

Videobank (Trademark, ISO Communications, Inc.)

A unique device that was developed at ISO Communications is the videobank which is used as a video databank to help reinforce skills and provide supplemental or enrichment activities in an interactive videodisc program. The whole notion of interaction is the retionale behind the videobank which contains skill-oriented still frames coordinated to each module or segment of the disc. Within a few seconds a teacher, trainer or viewer can access a bank of still frames to help reinforce basic skills, emphasize a particular concept, or provide additional help to learners who need or desire it. The videobank provides the opportunity to move back and forth from the dynamic televised content to the skill-oriented still frames. (McEntee and Blum, 1981).

The videobanks can be further subdivided into skillbanks or according to the level that the material is presented. Each skillbank could contain approximately 30 still frames related to a skill level that the teacher/trainer or user may choose activities from. ISO used 3 skillbanks in the ABC/NEA Schooldisc, ranging from simple to more complex exercises. This allowed remediation and enrichment activities to be incorporated into the design.

Additional information could also be located in the videobank such as bibliographic information containing additional references, a glossary of terms, visual images and a catalogue of additional verbal or visual items.

The videobank can be easily utilized by stopping the video segment and locating the specific frame in the skillbank which relates directly to the video segment being viewed. In order to facilitate its use, the browser was developed.

The Browser (Trademark ISO Communications, Inc.)

The browser is the device that allows the viewer, trainer or teacher to find the correct still frame in each skillbank. Located in the lower right hand corner of the screen is a small circle that makes one complete revolution every thirty frames when it is activated with the remote controller. Thus, one revolution signifies one skillbank and the user can easily see which section of the videobank he/she is in by looking at the browser as it revolves and stopping it at the correct point. Since all frames are numbered, the forward and reverse capability allows a user to quickly locate the desired frames (McEntee and Blum, 1981). To help further delineate the three skillbanks, the browser is color-coded to signify which level in the skillbank the user is in. For example, if the browser is blue, this would signify it was located in the first skillbank, if the browser is red it would be in the second skillbank, and if the browser was green it would be in the third skillbank. The emphasis here is on simplicity and consistency. The color-coding will help to visually locate specific levels of skill activities throughout

the videodisc.

These two features, the videobank and the browser, increase the quality of interaction by providing alternate means of accomodating learners' needs. It demands a different type of response from the learner other than the traditional multiple-choice format of pushing the correct key. By interacting directly with each user, the vidoedisc can create a unique instructional environment.

Summary

Quality of interaction can be greatly increased in computer-based videodisc materials by considering how such interactive techniques as mentioned above can be incorporated into the instructional design of the program. When analyzing a program in terms of its instructional effectiveness one important criterion to consider is its interactivity, or how it engages the learner in the instructional sequence so that the learner is actively involved with the program. It is therefore important to have a certain number of interactions per unit of time and this is, it can be argued, one method of measuring interaction. The point of view taken in this paper is that although quantity of responses is an important indicator of interaction, a variety of responses on the part of the learner is required and that the integration of various techniques into the program's design is crucial so as not to make the program boring. As important as each technique is separately, they must function together to ensure comprehensibility.

Both videodisc and computer-based instruction are in developmental stages and designers of materials need to explore their full potential. One significant way is to explore how quality of interaction between a student and the program can increase the quality of instruction. An important consideration in this process is the man/machine interface and how user-friendly it is.

The position taken in this paper is that the whole concept of interaction needs to be revised and conceived of in terms of quality, not just a student pushing a key and getting a "right" or "wrong" response. The techniques described here are but a start in trying to ascertain how to increase the quality of instruction.

References

Anderson, R.C., Kulhavy, R.W. and Andre, T. Conditions under which feedback facilitates learning from programmed lessons. Journal of Educational Psychology, 1972, 63, 186-188.

Barringer, C. and Gholson, B. Effects of type and combination of feedback upon conceptual learning by children: implications for research in academic learning. Review of Educational Research, 1979, 49, 459-478.

Cohen, Vicki Blum. Evaluating Instructional Software for the Microcomputer. Paper presented at the annual meeting of the American Educational Research Association, N.Y., N.Y., 1982.

Bork, A. Interaction in learning. In Proceedings of NECC '82. Columbia, Missouri. The University of Missouri, 1982.

Flavell, J.H. Cognitive Development. Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1977.

Gagne, R.M. and Briggs, L.J. Principles of Instructional Design. N.Y.: Holt, Rinehart and Winston, Inc., 1979.

Hartley, J.R. and Lovell, K. The psychological principles underlying the design of computer-based instructional systems. In James Hartley and Ivor Davies (eds.), Contributions to an Educational Technology, Volume 2. London: Kogan Page Limited, 1978.

Lumsdaine, A.A. Instruments and media of instruction. In N.L. Gage (ed.), Handbook of Research on Teaching. Chicago: Rand McNally, 1963.

McEntee, P. and Blum, V. The Schooldisc system. Videodisc News, October, 1981, 6-7.

The Yankee Group. The Optical Videodisc. Boston, MA: The Yankee Group, 1982.